

AMENDMENTS TO THE CLAIMS

Claims 1-12 (Canceled)

13. (Previously Presented) Surgical apparatus for accessing a beating heart via a xyphoid incision, said apparatus comprising:

a main body configured to rest against the frontal body of a patient in a resting position; and
a lifting arm rotatably mounted to said main body and adapted to engage a lowermost edge of the lowest rib of the patient and lift at least a portion of the ribs of the patient, relative to a remainder of the patient's body below the rib cage, while said main body maintains said resting position against the frontal body of the patient, when the patient is positioned horizontally.

14. (Previously Presented) The apparatus of claim 13, further comprising at least one contact point through which said main body rests against the frontal body of the patient, said at least one contact point providing support and stabilization during lifting by said lifting arm.

15. (Previously Presented) The apparatus of claim 14, comprising two contact points, and wherein said lifting arm is mounted to said body at a location intermediate of said two contact points.

16. (Previously Presented) The apparatus of claim 14, comprising three contact points, wherein said lifting arm engages the ribs in a location that is intermediate to said three contact points.

17. (Previously Presented) The apparatus of claim 13, further comprising a retractor arm mounted to said main body and adapted to engage and spread a portion of the ribs with respect to the remainder of the ribs, in a direction different from a direction of said lifting.

18. (Previously Presented) The apparatus of claim 17, wherein said retractor arm comprises a hinge to enhance positioning of a distal end of said retractor arm to engage the ribs.

19. (Previously Presented) The apparatus of claim 17, further comprising a first driving mechanism for driving said lifting arm with respect to said body to perform lifting, and a second driving

mechanism for driving said retractor arm with respect to said body to perform said spreading.

20. (Previously Presented) The apparatus of claim 17, further comprising a driving mechanism for driving said lifting arm and said retractor arm with respect to said body to perform lifting and spreading.

21. (Previously Presented) The apparatus of claim 13, further comprising a driving mechanism for driving said lifting arm with respect to said body to perform lifting.

22. (Previously Presented) The apparatus of claim 17, wherein said retractor arm is rotatably mounted to said body.

23. (Previously Presented) The apparatus of claim 22, wherein said retractor arm is mounted to said body via a hinge.

24. (Previously Presented) The apparatus of claim 13, further comprising a beating heart stabilizer mounted on said body.

25. (Previously Presented) The apparatus of claim 17, further comprising a beating heart stabilizer mounted on said body.

26. (Previously Presented) The apparatus of claim 17, further comprising a beating heart stabilizer mounted on said retractor arm.

27. (Previously Presented) The apparatus of claim 13, further comprising an organ positioner fixed to said body.

28. (Previously Presented) The apparatus of claim 13, further comprising a tissue positioner fixed to said body.

29. (Previously Presented) The apparatus of claim 13, further comprising a light mounted to said apparatus.

30. (Previously Presented) The apparatus of claim 29, wherein said light comprises a fiber optic light.

31. (Previously Presented) Surgical apparatus for use in performing surgery by accessing a beating heart via a xyphoid incision, said apparatus comprising:

an offsetting retractor configured to rest against the frontal body of a patient, contacting the frontal body at a location over the ribs and a location inferior to the ribs, to provide stability during lifting at least a portion of the lower ribs of the patient, and having a lifting arm rotatably mounted to a main body of the retractor and configured to engage a lowermost surface of a lowest rib of the patient and lift at least the portion of the lower ribs, while said retractor remains resting against the frontal body of the patient.

32. (Previously Presented) The apparatus of claim 31, further comprising a beating heart stabilizer mounted on said retractor.

33. (Previously Presented) The apparatus of claim 31, further comprising an organ positioner fixed to said retractor.

34. (Previously Presented) The apparatus of claim 31, further comprising a tissue positioner fixed to said retractor.

35. (Previously Presented) The apparatus of claim 31, further comprising a light mounted to said retractor.

36. (Previously Presented) The apparatus of claim 31, wherein said retractor further comprises a retractor arm adapted to engage and spread a portion of the ribs with respect to the remainder of the ribs, in a direction different from a direction of lifting by said lifting arm.

37. (Previously Presented) Surgical apparatus for accessing a beating heart via a xyphoid incision, said apparatus comprising:

a main body configured to rest against the frontal body of a patient in a resting position;

a lifting arm rotationally mounted to said main body and adapted to engage a lowermost edge of a lowest rib of the patient and lift at least a portion of the ribs of the patient, relative to a remainder of the patient's body below the rib cage, while said main body maintains said resting position against the frontal body of the patient, when the patient is positioned horizontally; and

a retractor arm mounted to said main body and adapted to engage and spread a portion of the ribs with respect to the remainder of the ribs, in a direction different from a direction of said lifting, wherein said retractor arm comprises a hinge to enhance positioning of a distal end of said retractor arm to engage the ribs.

38. (Previously Presented) Surgical apparatus for accessing a beating heart via a xyphoid incision, said apparatus comprising:

a main body configured to rest against the frontal body of a patient in a resting position;

a lifting arm movably mounted to said main body and adapted to engage a lowest rib from an inferior approach and lift at least a portion of the ribs of the patient, relative to a remainder of the patient's body below the rib cage, while said main body maintains said resting position against the frontal body of the patient, when the patient is positioned horizontally; and

a retractor arm mounted to said main body and adapted to engage and spread a portion of the ribs with respect to the remainder of the ribs, in a direction different from a direction of said lifting, wherein said lifting arm is rotatably mounted to said body.

39. (Canceled)

40. (Previously Presented) Surgical apparatus for accessing a beating heart via a xyphoid incision, said apparatus comprising:

a main body configured to rest against the frontal body of a patient in a resting position;

a lifting arm movably mounted to said main body and adapted to engage an inferior portion of a lowest rib of the patient and lift at least a portion of the ribs of the patient, relative to a remainder of the patient's body below the rib cage, while said main body maintains said resting position against the frontal body of the patient, when the patient is positioned horizontally;

a retractor arm mounted to said main body and adapted to engage and spread a portion of the ribs with respect to the remainder of the ribs, in a direction different from a direction of said lifting;

a first driving mechanism connected to said lifting arm and configured to drive said lifting arm

with respect to said body to perform lifting; and

a second driving mechanism connected to said retractor arm and configured to drive said retractor arm with respect to said body to perform said spreading.

41. (Previously Presented) Surgical apparatus for accessing a beating heart via a xyphoid incision, said apparatus comprising:

a main body configured to rest against the frontal body of a patient in a resting position, said main body comprising three contact points configured to contact the frontal body, one of said contact points contacting the chest of the patient superiorly of the incision, and the other two contact points configured to contact opposite sides of the pelvis when said one contact point contacts the chest superiorly of the incision; and

a lifting arm movably mounted to said main body and adapted to engage, via an inferior approach, a lowermost rib of the patient and lift at least a portion of the ribs of the patient, relative to a remainder of the patient's body below the rib cage, while said main body maintains said resting position against the frontal body of the patient, when the patient is positioned horizontally.

42. (Currently Amended) A method of accessing a beating heart to perform a surgical procedure, comprising:

making an incision proximate to or through a xyphoid appendage without substantially transecting a sternum;

inserting an offsetting retractor into the incision, and contacting tissue on one side of the incision with a first portion of the retractor, while engaging a lower surface ~~the lowermost edge~~ of the lowest rib on an opposite side of the incision with a second portion of the retractor; and

moving the second portion of the retractor in a direction substantially perpendicular to a horizontal orientation of a remainder of the retractor, thereby vertically offsetting at least a portion of the rib cage.

43. (Previously Presented) The method of claim 42, further comprising:
introducing a beating heart stabilizer to contact the beating heart.

44. (Previously Presented) The method of claim 43, further comprising establishing a coronary artery by pass graft.

45. (Previously Presented) The method of claim 42, further comprising relatively moving the first and second portion of the retractor away from one another in a direction substantially parallel to the horizontal orientation of a of the retractor, thereby further expanding an opening formed by the incision, prior to said introducing a beating heart stabilizer.

46. (Currently Amended) A method of accessing a beating heart to perform a surgical procedure, comprising:

making an incision proximate to or through a xyphoid appendage without substantially transecting a sternum;

contacting tissue on one side of the incision with a first portion of a retractor, while engaging a lower surface ~~the lowermost edge~~ of the lowest rib on an opposite side of the incision with a second portion of the retractor; and

moving the second portion of the retractor in a direction substantially perpendicular to a horizontal orientation of a remainder of the retractor, thereby vertically offsetting at least a portion of the rib cage.

47. (Currently Amended) Surgical apparatus for accessing a beating heart via a xyphoid incision comprising:

means for vertically offsetting a portion of the rib cage through an incision proximate to or through a xyphoid appendage without substantially transecting the sternum, said means for offsetting comprising means for engaging a lower surface ~~the lowermost edge~~ of the lowest rib on at least one side of the incision ; and

a locking mechanism to fix a position of the means for vertically offsetting in a vertically offset configuration.

48. (Previously Presented) The apparatus of claim 47, wherein the vertically offsetting means is a retractor having a lifting arm operably attached to a retractor frame.

49. (Previously Presented) The apparatus of claim 48, further comprising a retractor arm operably attached to the retractor frame.

50. (Previously Presented) The apparatus of claim 47, further comprising supporting arms attached to a retractor frame and having a plurality of contact points to engage a patient's body.

51. (Currently Amended) A method of performing cardiac surgery on a beating heart comprising:

making an incision proximate to or through a xyphoid appendage without substantially transecting the sternum;

engaging a lower surface ~~lowermost edge~~ of the lowest rib on at least one side of the incision; vertically offsetting at least a portion of the rib cage using a retractor; and performing a cardiac surgical procedure.

52. (Previously Presented) The method of claim 51, further comprising introducing a beating-heart stabilizer into the incision to contact the beating heart.

53. (Previously Presented) The method of claim 51, further comprising: introducing an organ positioner into the incision to engage an internal organ.

54. (Previously Presented) The method of claim 51, wherein the cardiac surgical procedure establishes a coronary artery bypass graft.